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Comparison of laparoscopic high and vaginal uterosacral ligament suspension in the management of apical prolapse

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ABSTRACT

Objective: Currently, the usage of uterosacral ligament suspension (USLS) procedures for apical prolapse is increasing. However, studies comparing the symptomatic outcomes of USLS procedures are lacking. We aimed to compare the anatomical and symptomatic outcomes between laparoscopic high USLS and vaginal USLS.

Materials and Methods: This retrospective case control study was conducted with patients who had undergone laparoscopic high USLS and vaginal USLS procedures performed at a university hospital from 2015 to 2020. The operative characteristics, POP-Q stages, Pelvic Floor Distress Inventory-20 (PFDI-20) and Patient Global Impression of Improvement (PGI-I) scores of both laparoscopic high USLS and vaginal USLS cases were compared.

Results: There were 35 laparoscopic high USLS and 37 vaginal USLS procedures with a follow-up of 12 months. The complications, operation time, length of hospital stay, POP-Q stages, PFDI-20 and PGI-I scores were similar between the groups ($p>0.05$).

Conclusion: Those patients with apical prolapse who had undergone laparoscopic high USLS had similar anatomical success and patient satisfaction rates compared to the vaginal procedure. When making a surgical plan for apical prolapse patients, it is appropriate to decide based on the patient's request, patient's gynecological history, the experience of the surgeon, and the equipment of the operating room.

Keywords: Uterosacral ligament suspension, laparoscopy, vaginal, symptoms, pelvic organ prolapse, patient satisfaction

INTRODUCTION

Apical vaginal prolapse is known as the descent of the uterus or vaginal cuff (after hysterectomy) towards the vagina.[1] Although the most common type of prolapse is anterior vaginal prolapse, apical support loss is usually present in a prolapse exceeding the hymen.[2] It is increasingly believed that patients with advanced prolapse need adequate support to the vaginal apex for durable and long-lasting surgical repair.[3] Anterior and posterior vaginal reconstructions may be unsuccessful if adequate apex support is not provided to the vaginal apex because the apex provides an important anatomical support to the vaginal wall.

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Surgical correction of the apex level can yield better results with high success rates. Today, apical suspension procedures are mostly performed by the vaginal route. Alternatively, they can be performed via the abdominal route (such as laparotomy, laparoscopy or robotic).[4] Among the various treatment alternatives, which is the most effective is still a matter of debate. In addition, the number of advocates for the use of the uterosacral ligament as a strong anatomical support in apical pelvic organ prolapse (POP) surgery is increasing day by day.[5,6]The uterosacral ligament is anatomically divided into three parts (proximal, intermediate and distal). In the method defined by Shull in 1994, suturing was made to the intermediate part of the uterosacral ligament.[7] To date, various modifications of this method have been developed. However, the distal part of the ligament is often damaged in patients with pelvic organ prolapse.[8] Recently, the high USLS (uterosacral ligament suspension) method was defined by suturing the proximal part of this ligament.[9] USLS procedure is performed without using mesh. Therefore, mesh complications, which may have very serious consequences, can be eliminated. In this study, we compared those patients with laparoscopic high USLS and those with vaginal USLS, and evaluated the symptomatic results of the two procedures.

MATERIALS AND METHODS

This retrospective case control study was conducted between January 2015 and January 2020 in Muğla Sıtkı Koçman University obstetrics and gynecology clinic with patients who had undergone laparoscopic high or vaginal USLS due to apical POP. The essential data was retrieved from the electronic database of hospital and the follow-up files of the patients. The study procedure was carried out in accordance with the Helsinki Declaration principles and initiated after the approval of the university ethics committee (approval number: 18.06.20-06/IX).

Cases who had undergone laparoscopic high or vaginal USLS due to apical prolapse with Pelvic Organ Prolapse Quantification (POP-Q) ≥stage 2 were included in this study. Those patients with missing data in the patient files, POP-Q stage ≤1, abnormal pap smear, suspicious adnexal mass, malignancy and/or cognitive problems were excluded from this study.

During this period, a total number of 79 patients underwent laparoscopic high USLS or vaginal USLS operation for apical prolapse. The data of three patients who met the exclusion criteria and four patients who could not complete the questionnaires were excluded from the study. Finally, 35 women with laparoscopic high USLS formed the laparoscopy group and 37 women with vaginal USLS formed the vaginal group.

The age, gravida, parity, body mass index (BMI), menopausal status, comorbidity (diabetes, hypertension, anemia), smoking habits, hormone replacement therapy status, intraoperative and postoperative complications, Pelvic Floor Distress Inventory-20 (PFDI-20) and Patient Global Impression of Improvement (PGI-I) scores of the patients were statistically compared between the laparoscopy and vaginal groups. The preoperative and 12th month postoperative POP-Q stages were compared between the two groups according to the POP-Q system.[10] The Clavien-Dindo classification was used to assess any postoperative complications.[11] To evaluate prolapse, urinary and bowel symptoms, we used the Turkish validated PFDI-20 questionnaire preoperatively and at the 12th month postoperative.[12] The PFDI-20 is a 20-item questionnaire whose subscales are the POP distress inventory-6 (POPDI-6), the urinary distress inventory-6 (UDI-6), and the colorectal/anal distress inventory-8 (CRADI-8). “No symptom” was scored as 0, “not at all” as 1, and “quite a bit” as 4. The scores for each subscale ranged from 0 to 100, with higher scores representing greater distress.[13] Anatomical success was considered evident if the most distal portion of the prolapse was more than 1cm above the level of the hymen at the 12th month after surgery.[14] The POP-Q staging was determined according to the clinical evaluation of patients on the day before the operation and at the 12-month postoperative clinical examination. The symptomatic results of the patients were evaluated with the data obtained according to the scores of the questionnaires performed preoperatively (the day before the operation) and at month 12 postoperatively, and comparisons between the two groups were made. All questionnaires were performed either face-to-face at routine clinical check-ups or by phone interview. There are routine 6-week and 12-month postoperative visits at our center.

Surgical procedure

The laparoscopic high USLS method was performed with the three ports technique.[9] Laparoscopic high USLS was performed with two laparoscopically placed sutures in each of the bilateral proximal uterosacral ligaments. Vaginal USLS procedures were performed transvaginally by using two ipsilateral sutures on the intermediate portion of each side and affixed to the vaginal cuff as previously described by Shull et al.[7]. We used no: 2/0 polyglactin (vicryl®) in both the laparoscopic and vaginal methods. When affixing the sutures to the vaginal cuff, we used pubocervical and rectovaginal fascia as a support during the suturing process in both the laparoscopic and vaginal approaches. In the laparoscopic group, the high USLS procedure was performed after total laparoscopic hysterectomy in all cases of uterine prolapse. In patients with cuff prolapse, we only

performed the USLS procedure. We also performed cystoscopy at the end of all USLS procedures. All surgical procedures were performed by two surgeons experienced in pelvic organ prolapse surgery.

Statistical analysis

All analyses were performed using the SPSS 23.0 program (SPSS for Windows Chicago, IL). In the descriptive statistics of the groups, the mean ± standard deviation or median (min-max) values were used. The Kolmogorov-Smirnov test was used in the distribution analysis of the data. In the comparison of the groups, Student's t-test was used for data with normal distribution, and Mann-Whitney U test was used for data with a skewed distribution. $p<0.05$ was considered statistically significant.

RESULTS

The demographic data are summarized in Table 1. The age, gravida, parity, BMI, menopausal status, smoking habit, comorbidities, history of incontinence or prolapse surgery, complications, operation time and hospital stay results of the two groups were similar. In particular, the mean ages of the women were 56.57±5.03 and 57.91±6.10 years in the laparoscopy and vaginal groups, respectively. The median BMI values were 28 kg/m^2 in both groups. The most common comorbidity was anemia in both groups. According to the Clavien-Dindo classification, no major intraoperative or postoperative complication (such as urinary tract injury, bowel/intestinal injury, or blood transfusion) was detected in the two groups. whereas one patient in vaginal group developed unilateral ureteral kinking postoperatively. In this case, a Double-J ureteric catheter was inserted into the ureter and no other intervention was required. The median operation time in the laparoscopy group was 115 minutes and it was 120 minutes in the vaginal group. There was also no statistical difference in the prolapse types. Twelve out of 35 patients (34.28%) had cuff prolapse in the laparoscopy group and eleven out of 37 patients (29.73%) had cuff prolapse

Table 1. Demographic characteristics of the two study populations

Variables	Laparoscopic high USLS (n=35) Mean ± SD Median (min–max)	Vaginal USLS (n=37) Mean ± SD Median (min–max)	p-value
Age (years)	56.57± 5.03	57.91± 6.10	0.446*
Gravida (n)	4 (1–8)	3 (2–8)	0.649$^{\Delta}$
Parity (n)	3 (1–5)	3 (1–5)	0.636$^{\Delta}$
BMI (kg/m^2)	28 (25–34)	28 (25–35)	0.417$^{\Delta}$
Menopausal status (n)			
Postmenopausal (n) (%)	29 (82.85)	33 (89.18)	0.441$^{\Delta}$
Premenopausal (n) (%)	6 (17.14)	4 (10.81)	
Smoking habit (n) (%)	7 (20)	3 (8.10)	0.148$^{\Delta}$
Comorbidities (n) (%)			0.197$^{\Delta}$
No comorbidities	15 (42.85)	7 (18.91)	
Anemia	9 (25.71)	15 (40.54)	
Cardiac disease	4 (11.42)	10 (27.02)	
Hypertension	5 (14.28)	5 (13.51)	
Diabetes	2 (5.71)	4 (10.81)	
Prolapse type (n) (%)			0.121$^{\Delta}$
Uterine prolapse	23 (65.71)	26 (70.27)	
Cuff prolapse	12 (34.28)	11 (29.73)	
History of prolapse surgery (n) (%)	2 (5.71)	6 (16.21)	0.159$^{\Delta}$
History of incontinence surgery (n) (%)	6 (17.14)	11 (29.72)	0.212$^{\Delta}$
Intraoperative complication	0	0	
Postoperative complication	0	1	0.327$^{\Delta}$
Operation time (min)	115	120	0.296$^{\Delta}$
Stay in hospital (day)	2	2	0.334$^{\Delta}$

*Independent sample t-test, $^{\Delta}$Man-Whitney U-test
USLS: uterosacral ligament suspension; BMI: body mass index; SD: standard deviation; min: minimum; max: maximum; n: number

in the vaginal group (p=0.121). The indication for USLS for all these women was pelvic organ prolapse. In those cases that had had a hysterectomy, indications were menorrhagia resistant to medical therapy or causing anemia, postmenopausal bleeding, fibroid disease and adenomyosis. All patients had a follow-up period of 12 months. There was no concurrent prolapse surgery such as anterior and posterior repair or incontinence procedure performed on any patient.

The preoperative and postoperative POP-Q stages of the two groups are summarized in Table 2. In regards to the preoperative POP-Q stages, there were 13 patients with stage 4 in both of the groups. At month 12 of postoperative follow-up, there were no patients in stage 3 or 4 of POP-Q in either group. The preoperative and postoperative month 12 POP-Q stages were similar between the groups (p=0.752, p=0.188 respectively). Using stage 2 of POP-Q as the recurrence criteria, the anatomical success rates reviewed after 12 months were 34/35 (97.14%) in the laparoscopy group and 35/37 (94.59%) in the vaginal group.

The preoperative and postoperative questionnaire scores of the two groups are summarized in Table 3. There was no difference between the two groups with respect to preoperative POPDI-6, UDI-6, CRADI-8 and PFDI-20 scores (p=0.777, p=0.475, p=0.149, p=0.521, respectively). The laparoscopy and vaginal groups had comparable postoperative POPDI-6, UDI-6, CRADI-8 and PFDI-20 scores (p=0.175, p=0.090, p=0.914 and p=0.244 respectively). Additionally, no statistically significant difference was observed

Table 2. Preoperative and postoperative POP-Q stages of two groups

Variables	Laparoscopic high USLS (n=35) Mean ± SD Median (min–max)	Vaginal USLS (n=37) Mean ± SD Median (min–max)	p-value
Preop POP-Q stage	3 (2–4)	3 (2–4)	
Stage 1 (n)	0	0	
Stage 2 (n) (%)	5 (14.28)	2 (5.40)	0.752$^{\Delta}$
Stage 3 (n) (%)	17 (48.57)	22 (59.45)	
Stage 4 (n) (%)	13 (37.14)	13 (35.13)	
Postop 12th month POP-Q stage	1 (1–2)	1 (1–2)	
Stage 1 (n) (%)	34 (97.14)	35 (94.59)	
Stage 2 (n) (%)	1 (2.86)	2 (5.40)	0.188$^{\Delta}$
Stage 3 (n)	0	0	
Stage 4 (n)	0	0	
Anatomical success rate	97.14%	94.59%	0.228$^{\Delta}$

$^{\Delta}$Man-Whitney U-test
POP: pelvic organ prolapse; USLS: uterosacral ligament suspension; Preop: preoperative; Postop: postoperative; SD: standard deviation; min: minimum; max: maximum; n: number

Table 3. Preoperative and postoperative POPDI6, UDI6, CRADI8 and PFDI and postoperative PGI-I scores of the two groups

Variables	Laparoscopic high USLS (n=35) Median (min–max)	Vaginal USLS (n=37) Median (min–max)	p-value
POPDI6 pre	75.00 (51.60–100.00)	75.00 (54.10–100.00)	0.777$^{\Delta}$
POPDI6 post	20.80 (4.16–48.00)	29.10 (4.16–51.00)	0.175$^{\Delta}$
UDI6 pre	75.00 (54.10–100.00)	75.00 (48–100.00)	0.475$^{\Delta}$
UDI6 post	29.10 (4.80–63.00)	33.00 (6.36–74.00)	0.090*
CRADI8 pre	66.60 (43.00–100.00)	64.00 (38.00–95.80)	0.149$^{\Delta}$
CRADI8 post	20.80 (8.30–63.00)	25.00 (4.16–54.00)	0.914$^{\Delta}$
PFDI20 pre	218.10 (153.20–263.30)	214.30 (155.50–262.40)	0.521$^{\Delta}$
PFDI20 post	80.80 (25.60–116)	86.30 (45.16–133.50)	0.244*
PGI-I post	1 (1–5)	2 (1–6)	0.304$^{\Delta}$

*Independent sample t-test, $^{\Delta}$Mann-Whitney U-test
POPDI-6: POP distress inventory-6; UDI-6: urinary distress inventory-6; CRADI-8: colorectal/anal distress inventory-8; PFDI-20: pelvic floor distress inventory-20; USLS: uterosacral ligament suspension; PGI-I: patient global impression of improvement; Pre: preoperative; Post: postoperative 12th month; SD: standard deviation; min: minimum; max: maximum; n: number

in the PGI-I questionnaire scores of the two groups (p=0.304). Indeed 20/35 (57.1%) of the patients in the laparoscopy group and 17/37 (45.9%) of the patients in the vaginal group described their post-operative condition as "very much better" after they had the surgery.

In the comparison of prolapse types, no statistically significant difference was detected that affects the results.

DISCUSSION

Novara et al.[15] compared the anatomical and functional aspects of patients who had undergone 69 vaginal high USLS and 155 McCall Culdoplasty procedures. In the post-operative 12th month anatomical evaluation, it was found that those patients in the high USLS group showed better improvement than those patients in the McCall Culdoplasty group. They also noted that prolapse recurrence rates were similar between the groups in their study (1.4% and 2.6%, respectively). Mounir et al.[16] approached the USLS from a different point of view where they compared the short-term results of vaginal extraperitoneal and intraperitoneal USLS. According to this study, the perioperative complication rates were similar between the groups. However, the extraperitoneal approach was found to be more favorable than the intraperitoneal in terms of operation time, bleeding time and hospitalization time. In our study, we applied extraperitoneal USLS to all of our patients and only one patient had a postoperative complication, which was not statistically significant. Turner et al.[17] compared vaginal and laparoscopic USLS and no significant difference was observed between the groups in terms of intraoperative and postoperative major complications.[17] In our research, we did not detect any major complication according to the Clavien-Dindo classification, except one case of ureteral kinking in the vaginal group. The operation time is another parameter to be compared. Mounir et al.[16] found the operation time of the extraperitoneal vaginal USLS group to be 133±43 minutes in their study. In our study, the median operation time was 115 minutes in the laparoscopic high USLS group, while it was 120 minutes in the vaginal USLS group. It is noteworthy that there was no statistical difference between the operation times in the two groups. In the study of Turner et al.[17], the operation time in the vaginal USLS group was statistically significantly shorter than the laparoscopy group. When their study is evaluated in terms of operation time, the fact that the operations were performed in different centers and with different methods suggests that this may have affected the standardization of their study.

In another study, Kadiroğulları et al.[18] applied vaginal USLS to 40 patients with 22 at stage 2 and 18 at stage 3 according to the POP-Q classification. According to the 24th month results of their study, stage 1 cuff prolapse was detected in five (13.8%) out of 36 patients, and stage 2 prolapse was not detected in any patient. Turner et al.[17] conducted a study methodologically similar to our study. In their study comparing 54 laparoscopic USLS and 119 vaginal USLS cases, prolapse recurrence was observed with a rate of 13.2% in the laparoscopic USLS group and 14.8% in the vaginal USLS group with a median follow-up of 21.5 weeks. At the 12-month follow-up in our study, prolapse recurrence was detected in two (5.40%) out of 37 patients in the vaginal USLS group, and only in one (2.86%) out of 35 patients in the laparoscopic high USLS group. According to these results, the lowest recurrence rate was determined in the laparoscopic high USLS group. We think that the reason for this result is that the upper parts of the uterosacral ligament, which are used as a natural suspender, are stronger than the caudal parts which are used in vaginal USLS.

Haj Yahya et al.[19] compared 106 women who had undergone transvaginal hysterectomy with USLS with 53 women who had undergone uterus preserving laparoscopic USLS. According to the results of their study, prolapse exceeding the hymen level was observed at a rate of 2.9% in the vaginal USLS group with a follow-up period of 14.7±13.23 months, and at 2% in the uterine preserving laparoscopic USLS group with a follow-up period of 17.5±15.84 months. In the POP-Q scoring system performed in both groups, a significant improvement was found in Ba, C and Bp points.

In addition to the technical and anatomical results mentioned above, another important issue for evaluating the success of the operation is patient satisfaction. The number of studies evaluating patient satisfaction with various questionnaires is very limited in the literature. In the study by Milani et al.[20] conducted on patients with transvaginal uterosacral ligament hysteropexy and hysterectomy + USLS, the mean PGI-I scores of the patients after 35 months were compared. As a result of this comparison, the PGI-I score was found to be higher in the hysteropexy group compared to the USLS group (1.7±0.9 vs. 1.4±0.6 respectively). However, the authors reported that hysteropexy increased the possibility of central recurrence and reoperation due to elongatio colli. Kadiroğulları et al.[18] applied the PISQ-12 questionnaire to patients who had undergone extraperitoneal vaginal USLS. There was no statistically significant difference between the questionnaire scores applied preoperatively and postoperatively at the 24th month. In a study by Novara et al.[15], vaginal high USLS and McCall Culdoplasty cases were compared using PISQ-12 (Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire), UIQ (Urinary Impact Questionnaire) and PFIQ-7 (Pelvic Floor Impact Questionnaire) questionnaires. Of these questionnaires, positive

improvement was only found in the vaginal high USLS group in terms of UIQ. The authors stated that this situation should be proven by urodynamics in following studies. Moreover, they attributed the lack of a significant difference for PISQ-12 to the similar total vaginal length measurements between the two groups.

Vallabh-patel et al.[21] compared robotic assisted laparoscopic and vaginal high USLS cases in their study. In their study, no difference was found between the two groups in terms of PFDI-20 scoring. In addition, the symptomatic results were similar in both groups. While no complications were encountered in the laparoscopic group with robotic assistance, one patient in the vaginal group had sacral nerve root damage and developed sciatic pain. In a recent study by Panico et al.[22] conducted on 60 patients who had undergone LHUSLS, their patients had a PGI-I score of 1 or 2 in 55 (91.6 %) out of 60 patients. In our study, we also evaluated the PGI-I scores of the patients and their satisfaction level was found to be similar between the laparoscopy and vaginal groups. In addition, it is worth emphasizing that the use of pubocervical and rectovaginal fascia as a support structure during affixing to the vaginal cuff might have affect the anatomical and satisfaction results for the USLS procedure in our study.

Limitations of the study

The strengths of this research consist of a high examination rate for the patients in the follow-up process and limited selection bias given that all patients who had undergone USLS during the study period were included. All preoperative PFDI-20 questionnaires were answered during the patient's initial office visit. Postoperative PFDI-20 and PGI-I questionnaire answers were collected via telephone interviews, asking patients to answer questions in real time thus avoiding recall bias. The retrospective design and small sample size are the major limitations of our research. However, the surgical operations were performed during the same time session and by the same surgeons. Additionally, these surgeons have extensive experience in vaginal and laparoscopic surgery. The short-term follow-up, especially for physical examinations, is another limitation of our study.

CONCLUSION

In conclusion, vaginal surgery is generally used more frequently than other approaches for apical prolapse surgery according to the literature. The short-term results of the current study are promising and show a high success rate for USLS for apical prolapsus. When deciding the route of surgery for apical prolapse patients, it is appropriate to decide according to the patient's request, the patient's gynecological history, the experience of the surgeon, and the equipment available in the operating room. Future prospective and long-term follow-up studies are needed to clarify these outcomes and further explore the feasibility of USLS in the treatment of apical POP.

ETHICS

Ethics Committee Approval: The study procedure was made in accordance with the Helsinki Declaration principles and initiated after the approval of the Muğla Sıtkı Koçman University Ethics Committee (approval number: 18.06.20-06/IX).

Informed Consent: Retrospective study.

Peer-Review: Internally peer-reviewed.

Contributions

Surgical and Medical Practices: A.A.S., Concept: B.S., M.F.K., E.A., M.N.A., İ.G., A.A.S., Design: B.S., M.F.K., E.A., M.N.A., İ.G., A.A.S., Data Collection and/or Processing: B.S., M.F.K., E.A., M.N.A., İ.G., Statistical Analysis: B.S., İ.G., Project Development: A.A.S., Writing: B.S., M.F.K.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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